

REMARKS

In the present Amendment, Claims 1 and 58 have been amended to incorporate the subject matter of Claims 9 and 59, respectively. Accordingly, Claims 9 and 59 have been canceled. Claim 3 has been amended to recite that at least two nickel layers and at least two silicide layers are alternately formed. Support is found, for example, in Fig. 3A.

No new matter has been introduced, and entry of the Amendment is respectfully requested. Upon entry of the Amendment, Claims 1-8, 10-58 and 60-65 will be pending, of which Claims 2, 7, 13-57 and 60-65 have been withdrawn from consideration.

Referring to Paragraph No. 7 on page 3 of the Office Action, Claims 1, 3, 5, 9-12, 58 and 59 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Natan (Non-Patent Literature: "Anomalous first-phase formation in rapidly thermal annealed, thin layered Si/Ni/Si films").

Referring to Paragraph No. 1 on page 5 of the Office Action, Claims 4, 8 and 11 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Natan in view of Bokhonov (Non-Patent Literature: "In-situ Investigation of the formation of nickel silicides during interaction of single-crystalline and amorphous silicon and nickel").

Referring to page 6 of the Office Action, Claim 6 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Natan in view of Mangelinck (Non-Patent Literature: "Formation of Ni silicide from Ni(Au) films on (111)Si").

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks and the amendment to the claims.

(a) Applicants submit that the present claims are patentable over the cited references *at least* because the claims require that the layer structure formed with the step of forming the layer structure is an **amorphous state**. The cited references fail to disclose or suggest this element of the presently claimed invention and the superior results obtained thereby.

Natan only discloses an amorphous state only in reference to the silicon (Si) layer. *See* Natan at p. 257, col. 2, line 40 to p. 258, col. 1, line 3. In contrast, the present claims require the layer structure, including the nickel (Ni) and the Si layers, to be formed in an amorphous state.

While it may have been known to form a Si layer into an amorphous state, Applicants submit that forming a metal such as Ni into a thin film with an ordinal PVD method provides a polycrystal. Therefore, an amorphous formation of Ni and other metals would not have been obvious to one of ordinary skill in the art at the time of the invention.

In addition, forming the layer structure in an amorphous state facilitates better diffusion between the layers prior to the thermal treatment step of forming nickel monosilicide. *See* Specification at the paragraph bridging pp. 5-6 and the first full paragraph on p. 21. Therefore, the Ni atoms in the amorphous nickel layer preferentially diffuse into the amorphous Si layer rather than the crystalline Si substrate. Accordingly, the consumption or “thinning” of the silicon substrate is minimized.

Moreover, the present invention provides unexpectedly superior results because the layer structure is formed in an amorphous state set as forth in the present application. *See* Specification at pp. 44-47. On the other hand, Natan does not disclose this feature and does not recognize the advantageous effects of the present invention. Thus, the present invention is patentable over Natan.

(b) With specific regard to Claim 3, Natan does not disclose, teach or suggest alternately forming at least two Ni layers and at least two Si layers as recited in amended Claim 3. Further, Applicants submit that it would not have been apparent to one of ordinary skill in the art to use multiple Ni and Si layers in order to achieve uniform formation of nickel silicide. Moreover, Natan does not teach, suggest or mention minimizing the thickness of the superimposed film in order to form a homogenous nickel monosilicide.

Accordingly, Natan fails to anticipate or render obvious the subject matter of Claim 3.

(c) With specific regard to Claim 4, the Office Action relied on Bokhonov as allegedly teaching that the layer structure is formed such that a ratio of the number of Ni atoms in each Ni layer contained in the layer structure to the number of Si atoms in each Si layer contained in the layer structure is equal to the ratio of the number of total Ni atoms to the number of total Si atoms existing in a whole layer structure.

Applicants respectfully disagree.

Bokhonov discloses that the ratio of atoms in the whole of the multilayer composition was two Ni atoms per one Si atom. *See* Bokhonov at p. 188, col. 2, ll. 7-15. However, it would not have been apparent to one of ordinary skill in the art in possession of the disclosure of Bokhonov that the ratio of the number of Ni atoms in each Ni layer to the number of Si atoms in each Si layer is equal to the ratio of the total Ni atoms to the total Si atoms in the *whole multilayer structure*.

Accordingly, Bokhonov does not remedy the shortcomings of Natan in disclosing the feature of Claim 4 above.

(d) With specific regard to Claim 12, the “room temperature” described in Natan is the film forming temperature, which is obviously different from a low temperature that is lower than a second substrate temperature after the step of forming the layer structure and before the step of the silicide reaction, as recited by Claim 12.

Accordingly, the features of Claim 12 are not anticipated by Natan.

In view of the above, reconsideration and withdrawal of the rejection of Claims 1, 3-6, 8-12, 58 and 59 based on Natan, Bokhonov and Mangelinck are respectfully requested.

Reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the local, Washington, D.C., telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Michael G. Raucci
Registration No. 61,444

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

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